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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,023	10/19/2001	Chang Rock Song	054216-5003	7126

9629 7590 09/09/2003

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EXAMINER

FOONG, SUK SAN

ART UNIT PAPER NUMBER

2823

DATE MAILED: 09/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/982,023

Applicant(s)

SONG, CHANG ROCK

Examiner

Suk-San Foong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 11, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Tsu et al. ('420).

Okuno et al. is relied on for the teachings discussed in the rejections of paragraph 3 of the Office Action mailed on 3/20/03.

Okuno et al. do not disclose the step as recited in claim 1, lines 7-8.

Lou is relied on for the teachings discussed in the rejections of paragraph 3 of the Office Action mailed on 3/20/03 as providing motivation to enable formation of conductive or doped polysilicon film in contact hole 203 of Okuno et al. to be performed.

The combination of Okuno et al. and Lou do not disclose forming interlayer insulating film comprised of silicate glass material such as PSG and USG.

The combination of Okuno et al. and Lou do not disclose performing NH₃ plasma process and N₂O plasma process prior to depositing BST dielectric film.

Yang et al. is relied on for the teachings discussed in the rejections of paragraph 3 of the Office Action mailed on 3/20/03 as providing motivation to enable the formation of insulating film 20 of the combination process to be performed.

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Yang et al. is relied on for the teachings discussed in the rejections of paragraph 3 of the Office Action mailed on 3/20/03 as providing motivation to enable the formation of first electrode 216 of the combination process to be performed.

The combination process does not disclose that the nitridation process is performed using a NH_3 plasma process.

Tsu et al. discloses a method of forming capacitors in semiconductor devices which includes forming first electrode 18 comprised of material such as ruthenium (Col. 5, lines 4-6, Col. 6, lines 6-9, and Fig. 3B), then performing a nitridation process using NH_3 plasma process plus RTN (Col. 6, lines 31-33, and Fig. 3E), subsequently depositing capacitor dielectric film 16 over first electrode 18 (Col. 6, lines 58-65, and Fig. 3F), and then forming upper electrode 14 over capacitor dielectric film 16 (Col. 6, lines 66-67, and Fig. 3G).

It would have been within the scope to one ordinary skill in the art to combine the teachings of the combination process with Tsu et al. because it would enable the nitridation process of the combination process to be performed and obtain further advantage of providing better oxidation resistance and higher work function than a pure metal electrode (Tsu et al., Col. 6, lines 33-34).

The combination process does not disclose crystallizing BST dielectric film through rapid thermal process.

The combination process does not disclose performing a thermal treatment to stabilize said capacitor.

In regard to claim 11, the combination process does not disclose depositing the BST dielectric film by chemical vapor deposition method and the thickness of about 150 to 500 Å.

Iizuka is relied on for the teachings discussed in the rejections of paragraph 3 of the Office Action mailed on 3/20/03 as providing motivation to enable the formation BST dielectric film 217 of the combination process to be performed and obtain further advantage of suppressing leak current.

With respect to claim 11, note that the disclosed thickness of the BST dielectric film is within the recited range.

Iizuka is relied on for the teachings discussed in the rejections of paragraph 3 of the Office Action mailed on 3/20/03 as providing motivation to enable the formation capacitor 219 of the combination process to be performed and obtain further advantage of improving the crystallization of the boundary between top electrode and BST dielectric film and reducing leak current at room temperature.

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Tsu et al. ('420) as applied to claims 1, 11, 13 and 16 above.

In regard to the thickness of the nitride film as recited in claim 2, as previously stated in paragraph 4 of the Office Action mailed on 3/20/03, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima

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facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

4. Claims 3, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Tsu et al. ('420) as applied to claims 1, 11, 13 and 16 above, and further in view of Graettinger et al. ('709) as previously applied.

The combination process does not disclose the steps as recited in claim 3 and 4.

The combination process does not disclose the recited thickness of the anti-diffusion film and the deposition method such as physical vapor deposition or chemical vapor deposition.

Graettinger et al. is relied on for the teachings discussed in the rejections of paragraph 5 of the Office Action mailed on 3/20/03 as providing motivation to enable the formation of the doped polysilicon layer of the combination process to be performed.

Graettinger et al. is relied on for the teachings discussed in the rejections of paragraph 5 of the Office Action mailed on 3/20/03 as providing motivation to enable the formation of anti-diffusion film 207 of the combination process to be performed and obtain further advantage of preventing dopant diffusion.

As previously stated in paragraph 5 of the Office Action mailed on 3/20/03, the choice of thickness of the doped polysilicon and the depth of the etch-back process would have been a

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matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

As previously stated in paragraph 5 of the Office Action mailed on 3/20/03, the choice of thickness of the anti-diffusion film would have been a matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Tsu et al. ('420) as applied to claims 1, 11, 13 and 16 above

As previously stated in paragraph 6 of the Office Action mailed on 3/20/03, the choice of thickness of the ohmic contact layer would have been a matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Tsu et al. ('420) as applied to claims 1, 11, 13 and 14 above.

As previously stated in paragraph 7 of the Office Action mailed on 3/20/03, the choice of thickness of interlayer insulating film would have been a matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

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7. Claims 8 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Tsu et al. ('420) as applied to claims 1, 11, 13 and 16 above.

As previously stated in paragraph 8 of the Office Action mailed 3/20/03, the choice of thickness of the first electrode and the second electrode would have been a matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

8. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Tsu et al. ('420) as applied to claims 1, 11, 13 and 16 above.

As previously stated in paragraph 9 of the Office Action mailed 3/20/03, one of ordinary skill in the art would have been motivated to arrive at selected power, pressure, flow rate and temperature for use in the process of the combination through routine experimentation depending on the desired device dimension and device characteristics because power, pressure, flow rate and temperature are recognized to be result effective variables.

9. Claims 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Tsu et al. ('420) as applied to claims 1, 11, 13 and 16 above.

As previously stated in paragraph 10 of the Office Action mailed 3/20/03, one of ordinary skill in the art would have been motivated to arrive at selected power, pressure, flow rate and

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temperature for use in the process of the combination through routine experimentation depending on the desired device dimension and device characteristics because power, pressure, flow rate and temperature are recognized to be result effective variables.

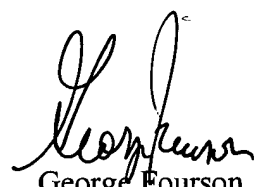
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

SV

September 5, 2003


George Fourson
Primary Examiner
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